CLAIMS

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1. A process for fabricating a thin-film device, said process comprising the steps of:

forming a conducting layer composed of an anodically oxidizable metal on a substrate;

etching said conducting layer to form a plurality of bus lines having upper surfaces parallel to said substrate and inclined side surfaces and connection portions electrically connected to said bus lines and having upper surfaces parallel to said substrate and inclined side surfaces; and

anodically oxidizing said bus lines and said connection portions so that said bus lines and said connection portions include inner conducting portions and outer insulating oxide films covering said inner conducting portions respectively.

2. A process according to claim 1, wherein said etching step is carried out so that the side surfaces of said bus lines and the side surfaces of said connection portions are inclined at angles within the range from 20 degrees to 60 degrees, an average, with respect to said substrate.

3. A process according to claim 2, wherein said etching step is carried out so that the side surfaces of said bus lines and the side surfaces of said connection portions are inclined at angles within the range from 30 degrees to 50 degrees, an average, with respect to said substrate.

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4. A process according to claim 1, further comprising the step for forming a mask on said conducting layer prior to said etching step, and the step for ashing said substrate including said mask between said mask forming step and said etching step.

5. A process according to claim 1, further comprising the step for forming a mask on said conducting layer and the step for baking said mask prior to said etching step, wherein the temperature for baking said

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mask in said baking step is so set that said mask will have a relatively small rigidity so that an outer portion of said mask is pushed up from said conducting layer due to a reaction gas in said etching step.

6. A process according to claim 5, wherein the temperature for baking said mask in said baking step is not higher than 115°C.

7. A process according to claim 5, wherein said etching step is carried out so that the side surfaces of said bus lines and the side surfaces of said connection portions are outwardly convex.

8. A process according to claim 5, wherein said etching step is carried out so that the angles between the upper surfaces and the side surfaces of said bus lines and of said connection portions are obtuse angles.

9. A process according to claim 1, further comprising an ionic milling step for removing part of the outer oxide films to expose the inner conducting portions after said step of anodic oxidation.

10. A thin-film device comprising at least a substrate, a plurality of bus lines provided on said substrate, and connection portions electrically connected to said bus lines, said bus lines and said connection portions being formed of an anodically oxidizable metal and having upper surfaces parallel to said substrate and inclined side surfaces, respectively, said bus lines and said connection portions including inner conducting portions and outer insulating oxide portions formed by anodic oxidation to cover said inner conducting portions, respectively.

11. A thin-film device according to claim 10, wherein said thin-film device is a substrate including thin-film transistors.

12. A thin-film device according to claim 11, wherein the substrate including said thin-film transistors is a substrate of a liquid crystal display device, said bus lines are gate bus lines, and said

connection portions are gate electrodes of said thin-film transistors, said thin-film device further comprising an insulating layer covering said bus lines and said connection portions, a plurality of drain bus lines arranged on said insulating layer to cross said gate bus lines, and a plurality of pixel electrodes.

13. A thin-film device according to claim 12, further comprising storage capacitor electrodes arranged on said substrate and made of the same material as said gate bus lines and said connection portions.

14. A thin-film device according to claim 10, wherein said thin-film device is an MIM diode.

15. A thin-film device according to claim 10, wherein said anodically oxidizable metal comprises at least one selected from the group consisting of Al, Ta, Al-Si, Al-Ta, Al-Zr, Al-Nd, Al-Pd, Al-W, Al-Ti, Al-Ti-B, Al-Sc, Al-Y, Al-Pt, and Al-Pa.

16. A thin-film device according to claim 10, wherein the side surfaces of said bus lines and the side surfaces of said connection portions are inclined at angles within the range from 20 degrees to 60 degrees, on average, with respect to said substrate.

17. A thin-film device according to claim 16, wherein the side surfaces of said bus lines and the side surfaces of said connection portions are inclined at angles within the range of from 30 degrees to 50 degrees, on average, with respect to said substrate.

18. A thin-film device according to claim 10, wherein the side surfaces of said bus lines and the side surfaces of said connection portions are outwardly convex.

19. A thin-film device according to claim 10, wherein the angles between the upper surfaces and the side surfaces of said bus lines and of said connection portions are obtuse angles.

20. A thin-film device according to claim 10, wherein at least two outer oxide films of said bus lines

and said connection portions contact each other and the contacting outer oxide films electrically isolate the inner conducting portions covered by said contacting outer oxide films.

21. A thin-film device according to claim 10, wherein a conducting portion separate from said bus lines and said connecting portions is arranged close to said bus lines or said connecting portions; said separate conducting portion includes an inner conducting portion and an outer insulating oxide portion covering said inner conducting portion; the outer oxide film of said separate conducting portion contacts at least one outer oxide film of said bus lines and of said connection portions; and said contacting outer oxide films electrically isolate the inner conducting portions that are covered by said contacting outer oxide films.

22. A process for fabricating a thin-film device, said process comprising the steps of:

forming a conducting layer composed of an anodically oxidizable metal on a substrate;

etching said conducting layer in a predetermined shape;

forming a second oxide film on said conducting layer by anodic oxidation after a first oxide film with a thickness is formed on said conducting layer; and

washing said substrate, whereby said first oxide film is removed by said washing and said second oxide film is not removed by said washing but remains on said conducting layer so as to cover said conducting layer.

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23. A process according to claim 22, wherein said anodically oxidizable metal includes at least one of Al, Ta, Al-Si, Al-Ta, Al-Zr, Al-Nd, Al-Pd, Al-W, Al-Ti, Al-Ti-B, Al-Sc, Al-Y, Al-Pt, and Al-Pa.

24. A process according to claim 22, wherein said first oxide film is one of a naturally oxidized film or a

hydrated film formed on the surface of said anodically oxidizable metal.

25. A process according to claim 22, wherein said first oxide film has a thickness from 50 nm to 100 nm.

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26. A process according to claim 22, wherein said washing step is executed using ultrasonic waves of not lower than 200 KHz.

27. A process according to claim 22, wherein said thin-film device is a substrate including thin-film transistors.

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28. A process according to claim 27, further comprising a step for forming an insulating film on said substrate and a step for forming a semiconductor layer on said substrate after the second oxide film has been formed, wherein the step for etching said conducting layer forms gate electrodes and gate wirings.

29. A process according to claim 27, further comprising a step for forming a semiconductor layer on said substrate and a step for forming an insulating film on said substrate prior to forming said conducting layer, wherein the step for etching said conducting layer forms gate electrodes and gate wirings.

30. A process according to claim 22, wherein the step for etching said conducting layer forms gate electrodes having upper surfaces parallel to said substrate and inclined side surfaces.

31. A process for fabricating a thin-film device, said process comprising the steps of:

forming a semiconductor layer having a predetermined shape on a substrate;

forming an insulating film on said substrate to cover said semiconductor layer;

forming a conducting layer composed of an anodically oxidizable metal on said substrate in such a shape as to cover a portion of said semiconductor layer and to form gate electrodes having upper surfaces parallel to said substrate and inclined side surfaces;

anodically oxidizing said gate electrodes;

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forming said insulating film into a predetermined shape using said gate electrodes including the anodically oxidized film as a mask; and

injecting impurities into said semiconductor layer using said gate electrodes including said anodically oxidized film and said insulating film as a mask to form an offset in said semiconductor layer.

32. A process according to claim 31, wherein said thin-film device is a substrate including thin-film transistors.

33. A process according to claim 31, wherein said anodically oxidizable metal includes at least one of Al, Ta, Al-Si, Al-Ta, Al-Zr, Al-Nd, Al-Pd, Al-W, Al-Ti, Al-Ti-B, Al-Sc, Al-Y, Al-Pt, and Al-Pa.

34. A process according to claim 31, wherein said anodically oxidized film is a barrier-type anodically oxidized film.

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35. A process according to claim 31, wherein said semiconductor layer comprises a polycrystalline silicone.

36. A process according to claim 31, wherein an initial current density at the time of executing the anodic oxidation is not smaller than 2.0 mA/cm^2 but is not larger than 3.0 mA/cm^2.

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37. A process according to claim 31, wherein the step for forming said gate electrodes comprises the step for forming a gate electrode layer and the step of patterning the gate electrode layer based on either ionic milling or dry-etching.

38. A process according to claim 31, wherein a masking resist is formed on said conducting layer and is post-baked at a temperature of not lower than 130°C but not higher than 200°C, prior to forming said gate electrode.

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39. A thin-film device comprising a substrate, a semiconductor layer formed in a predetermined shape on

said substrate, an insulating film covering a portion of said semiconductor layer, a gate electrode formed on said insulating film, and an anodically oxidized film of said gate electrode formed on said insulating film so as to cover said gate electrodes, said anodically oxidized film having a shape as viewed from above which is identical to the shape of said insulating film as viewed from above and having an annular portion in annular contact with said insulating film about said gate electrode, a portion of said semiconductor layer located on the outer side of said insulating film forming a source electrode and a drain electrode, and a portion of said semiconductor layer covered by said annular portion of said anodically oxidized film forming an offset on the inner side of said insulating film.

40. A liquid crystal display device, comprising:

a first substrate comprising the thin-film device having a plurality of thin-film transistors according to claim 10 or 39;

a second substrate opposite to the first substrate; and

a liquid crystal layer filled between the first and second substrates.